

REMARKS

This paper is responsive to the Office Action mailed November 15, 2002 in connection with the above-identified patent application. In that Action, claims 55-57, 61-63, and 67-69 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,978,796 to Malloy, et al. Claims 58, 59, 64, 65, 70, and 71 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Malloy, et al. in view of U.S. Patent No. 6,381,605 to Kothuri, et al. Lastly, claims 60, 66, and 72 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Malloy, et al. further in view of U.S. Patent No. 6,094,651 to Agrawal, et al.

The Present Invention:

For purposes of review, the present invention relates to the creation and use of an index to access a subject multi-dimensional database. An embodiment of the invention receives an indication of a number of features of a subject multi-dimensional database to be identified, and then performs feature identification on the subject multi-dimensional database. An index for accessing the subject multi-dimensional database is created using the identified number of features. The index itself may be a multi-dimensional database.

As described in the specification on page 11, beginning at line 18:

In order to create the index, the Index System 124 passes the indexing parameters 128 to feature identification software 122 for use in finding "features" in the subject multi-dimensional database 136. Then, the Index System finds the "features" with the feature identification software 122. Next, the Index System builds the index 134 using the features as points for indexing into the subject multi-dimensional database 136. Then, the

Index System 124 provides navigation capabilities for navigating the index 134 to access the subject multi-dimensional database 136.

The invention provides a user interface to set up definitions for the subject multi-dimensional database to be mined, dimensions to be mined, measures to be mined, mining technique (i.e., feature identification) parameters, and number of results to be stored. The user interface directly drives a mining run. Additionally, the invention supports traversal of the multi-dimensional database, execution of the mining technique, and generation of result data. In one embodiment, the mining technique scans the subject multi-dimensional database and the result data is used to create an index. Operations for creating and deleting the index are provided as well as for outline definition, data population, cell note creation, and link partition definition. The invention provides capabilities for exploration and visualization of the result data against the subject multi-dimensional database.

Overall, the invention automatically builds the index, along with links to the subject multi-dimensional database. The invention also stores the index data in a spreadsheet data file, so that a spreadsheet user could view a list of deviations in one spreadsheet and link to cells in the subject multi-dimensional database using a linked partition mechanism.

There are many advantages to the invention including its straightforward implementation. Also, the invention does not require any additional functions or support from the developers of the subject multi-dimensional database, it does not modify the existing subject multi-dimensional database, and it does not store extra data in the subject multi-dimensional database. Extra explanations are selectively stored as cell notes on the index as desired, providing visualization and navigation of the multi-

dimensional data. Furthermore, the invention is easily managed and can be applied with any data mining technique that can identify point of interest in a multi-dimensional database (i.e., a feature identification technique). The infrastructure of the invention supports plug-in techniques and can extend the solution beyond deviation detection.

U.S. Patent No. 5,978,796 to Malloy, et al.:

U.S. Patent No. 5,978,796 to Malloy, et al. teaches a method, apparatus, and article of manufacture for using a relational database management system (RDBMS) to support on-line analytical processing (OLAP) systems. As noted in the background of the Malloy, et al. '796 patent, RDBMS software has typically been used with databases comprised of traditional data types that are easily structured into tables. However, RDBMS products have limitations with respect to providing users with specific views of data. Accordingly, "front-ends" have been developed for RDBMS products so that data retrieved from the RDBMS can be aggregated, summarized, consolidated, summed, viewed, and analyzed. These "front-ends" do not, however, easily provide the ability to consolidate, view, and analyze data in the manner of "multi-dimensional data analysis." This type of functionality is also known as on-line analytical processing (OLAP).

Accordingly, therefore, the Malloy, et al. '796 patent proposes to emulate a multi-dimensional database using a relational database. Another object is to provide a relational database implementation of a multi-dimensional database using a star schema. Still further, another object of the Malloy, et al. '796 patent is to map data blocks of a multi-dimensional database to rows in a relational database using a dimension identifier.

At a practical level, the Malloy, et al. '796

patent teaches a system which replaces the integrated multi-dimensional data storage manager of Arbor Software's Essbase OLAP software with a relational database storage manager based on IBM's DB2 RDBMS software. The relational database storage manager enables the OLAP system to store data directly into a relational database.

As noted at column 6, beginning at line 10 of the Malloy, et al. '796 patent, Figure 2 illustrates a conceptual multi-dimensional database used by the system for emulation. The emulated multi-dimensional database has a logical structure as shown in Figure 3.

Applicants respectfully direct the Examiner's attention to the Malloy, et al. '796 patent at column 8, beginning at line 17 whereat it is described that Figure 4 is a diagram that illustrates a structure for storing multi-dimensional data in a relational database structure. The data is stored in a star schema 400 in the relational database 118 as opposed to a specialized multi-dimensional data store as described in the '724 patent. It is further described there that in order to work correctly with Arbor Software's Essbase OLAP software, the storage manager 114 and DB2 server 116 of the Malloy, et al. system work together to emulate the structure and functions performed in the '724 patent, even though a different database is used to store the multi-dimensional data.

All Pending Claims are Patentably Distinct and Unobvious Over the References of Record:

Referring once again to the Office Action in greater detail, claims 55-57, 61-63, and 67-69 were rejected as being anticipated by U.S. Patent No. 5,978,796 to Malloy, et al. The Examiner took the position that the Malloy, et al. '796 patent teaches a method, apparatus, and article of manufacture of accessing a subject multi-dimensional database stored on a data store connected to a computer.

Applicants respectfully disagree with the Examiner's position on the Malloy, et al. '796 patent regarding teaching accessing a subject multi-dimensional database stored on a data store connected to a computer. As pointed out above, an object of the Malloy, et al. '796 patent is to emulate a multi-dimensional database using a relational database. Accordingly, therefore, there is no teaching in the Malloy, et al. '796 patent of accessing a subject multi-dimensional database stored on a data store connected to a computer as recited in the pending claims.

Referring yet once again to the Office Action in greater detail, independent claims 55, 61, and 67 were indicated by the Examiner as being anticipated by the Malloy, et al. '796 patent as teaching a method, apparatus, and article of manufacture comprising receiving an indication of a number of features of a subject multi-dimensional database to be identified, performing feature identification to identify the indicated number of features, and creating an index for the subject multi-dimensional database using the identified number of features. Applicants again respectfully disagree with the Examiner's position regarding the Malloy, et al. '796 patent.

More particularly, it is respectfully submitted that the Malloy, et al. patent teaches emulating a multi-dimensional database using a relational database. The Malloy system replaces the integrated multi-dimensional data storage manager of Arbor Software's Essbase OLAP software with a relational database storage manager based on IBM's DB2 RDBMS software. The relational database storage manager enables the OLAP system to store data directly into a relational database.

The Malloy, et al. '796 patent does not teach, suggest, nor fairly disclose any aspects whatsoever related to "features" of a multi-dimensional database. As pointed out in the subject application at page 6, beginning at line

22, an index system 124 is invoked by an indexing parameter's collection GUI 104. Then, the index system 124 invokes feature identification software 122 and passes the indexing parameters file 128 to the features identification software 122. The feature identification software 122 performs data mining to obtain a specified number of deviations for one or more members of the subject multi-dimensional database 136. In particular, the feature identification software retrieves data from the subject multi-dimensional database 136. The feature identification software 122 accesses the subject multi-dimensional database 136 via an OLAP client network interface 126 to interface with the OLAP server network interface 146 which in turn interfaces with an OLAP database system 138 in order to access the subject multi-dimensional database 136 and return data to the feature identification software 122 via the OLAP server network interface 146 and the OLAP client network interface 126.

Importantly, the feature identification software 122 returns data to the index system 124, which uses the returned data to create an index.

It is to be appreciated that, as pointed out beginning at the bottom of page 13 of the subject application, the feature identification software may use any technique that can identify specific points or regions of interest in a multi-dimensional database. The result is an ordered list of multi-dimensional points. Some feature identification techniques may have additional information about features, such as the dimension along which the feature is most apparent. The Malloy, et al. '796 patent simply does not utilize feature identification in a multi-dimensional database.

According to the above, therefore, applicants respectfully submit that the Malloy, et al. '796 patent does not teach, suggest, or fairly disclose the limitations recited in independent claims 55, 61, or 67 of the instant

application. That reference does not teach storing a multi-dimensional database on a data store or accessing a stored multi-dimensional database. In addition, the patent cited by the Examiner does not receive an indication of a number of features of a subject multi-dimensional database to be identified, nor does it perform feature identification on the subject multi-dimensional database to thereby create an index for the subject multi-dimensional database.

It is further respectfully submitted that neither the Kothuri, et al. '605 patent nor the Agrawal, et al. '651 patent teach, suggest, or fairly disclose the above limitations.

For at least the above reasons, it is respectfully submitted that claims 55-57, 61-63, and 67-69 are patentably distinct and unobvious over the references of record. Additionally, dependent claims 58-60 and 64-66 are also respectfully submitted to the patentably distinct and unobvious over the art of record.

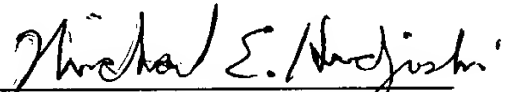
Conclusion

In view of the above remarks and arguments presented, it is respectfully submitted that all pending claims are in condition for allowance.

Allowance of all pending claims and early notice to that effect is respectfully requested.

Respectfully submitted,

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